

I. THALLOPHYTES.

Cellular plants, with or without stem-like habit of growth.

SEXUAL PHASE, (GENERATION.)

Male ♂.

Female ♀.

ASEXUAL PHASE, (GENERATION.)

The product of fructification.

I. Myxomycetes.		II. Diatomaceæ.	III. Schizophyta.	IV. Algæ.
<i>Plants of uncertain affinity.</i>			Simple plants. Reproduction wholly asexual by means of resting spores, or more generally by simple division of a mother cell.	<i>Sexual organs often Prothallus none. Vegetative reproduction</i> Sexual reproduction various. By means of motile or fixed gametes, consisting of similar (Isogamous) or dissimilar (Oogamous) cells as spermatozoids and oospheres. Also by conjugation of similar cells which show no differentiation from the plant. No clearly defined alternation of generations.
Reproduction wholly asexual.		Reproduction asexual by means of auxospores, the formation of more rarely conjugative with zygospores.		Asexual reproduction conspicuous; usually by motile cells (zoogonidia) arising as vegetative structures; sometimes the indirect product of fructification. Vegetation of the oospore sometimes resulting in a proembryo.

CLASSIFICATION OF PLANTS WITH

By D. P.

II. BRYOPHYTES.

Cellular plants with rudimentary stomata.

growth.

algæ.	V. Fungi.	I. Hepaticæ.	II. Muscineæ.	I. Filicineæ.	
<i>Sexual organs often distinct.</i> <i>none. Vegetative reproduction conspicuous.</i>		<i>Sexual organs distinct. Prothallus none.</i> <i>Vegetative reproduction subordinate.</i>		<i>Homosporous. Prothallus</i>	
reproduction vari- as of motile or , consisting of (gametes) or dis- junct) cells as and oospheres. reproduction of simi- show no differ- the plant. defined alterna- tions.	Sexual reproduction vari- ous. Sometimes by anthe- ridia and oogonia. Spermat- ozoids none. No clearly defined alterna- tion of generations.	1. The perfect plant, ♀ or ♂ ♀. 2. Antheridia, ♂. 3. Spermatozoids motile.		1. Prothallus perfect ♀. 2. Antheridia ♂. 3. Spermatozoids motile.	
		I. The perfect plant, ♀ or ♂ ♀. II. Archegonium, ♀. III. Oosphere (Ovum or Germ Cell.)		I. Prothallus perfect ♀. II. Archegonium ♀. III. Oosphere (Ovum or Germ Cell.)	
reproduction con- sistently by motile (gametes) arising as structures; some- times direct product of of the oospore resulting in a pro-	Asexual reproduction pre- dominant and varied: usually by means of non-motile cells (gonidia) or by motile cells (zoogondia.)	IV. Oospore. V. Embryo rudimentary. VI. Sporogonium parasitic upon the sexual generation. VII. Spores with or without elaters. VIII. Protonema.		IV. Oospore. V. Embryo rudimentary. VI. Normal plant. VII. Sporocarps or fertile leaves. VIII. Sporangia. IX. Spores simple.	

PLANTS WITH REFERENCE TO THE LIFE

By D. P. PENHALLOW, B. Sc.

III. PTERIDOPHYTES. (Vascular Cryptogams.)

Plants with true vascular structure: Epidermis and stomata present.

			Archegoniata.	Oosphere enclosed in an
I. Filicineæ.	II. Equisetineæ.			III. Lycopodineæ.
<i>Homosporous. Prothallus one.</i>		Lycopodium.		Selaginella.
				<i>Heterosporous.</i>
Prothallus perfect ♂.	1. Prothallus perfect ♂.	1. Prothallus rudimentary ♂.	1. Prothallus rudimentary ♂.	1. Prothallus rudimentary ♂.
Antheridia ♂.	2. Antheridium ♂.	2. Antheridium ♂.	2. Antheridium.	2. Antheridium.
Spermatozooids motile.	3. Spermatozooids motile.	3. Spermatozooids motile.	3. Spermatozooids motile.	3. Spermatozooids motile.
Prothallus perfect ♂.	I. Prothallus perfect ♂.	I. Prothallus rudimentary ♂.	I. Prothallus rudimentary ♂.	I. Prothallus rudimentary ♂.
Archegonium ♀.	II. Archegonium ♀.	II. Archegonium ♀.	II. Archegonium.	II. Archegonium.
Oosphere (Ovum or Germ Cell.)	III. Oosphere (Ovum or Germ Cell.)	III. Oosphere (Ovum or Germ Cell.)	III. Oosphere (Ovum or Germ Cell.)	III. Oosphere (Ovum or Germ Cell.)
Oospore.	IV. Oospore.	IV. Oospore.	IV. Oospore.	4. Oospore.
Embryo rudimentary.	V. Embryo rudimentary.	V. Suspensor?	V. Suspensor.	5. Suspensor.
Normal plant.	VI. Normal plant.	IV. Embryo.	VI. Embryo imperfect.	6. Embryo imperfect.
Sporocarps or fertile leaves.	VII. Scales of fertile spike.	VII. Normal plant.	VII. Normal plant.	7. Normal plant.
Sporangia.	VIII. Sporangia.	VIII. Sporangiferous leaf.	VIII. Sporangiferous leaf.	8. Sporangiferous leaf.
Spores simple.	IX. Spores with elaters.	IX. Sporangium.	IX. Macrosporangia.	9. Macrosporangia.
		X. Spores.	X. Microspores.	10. Microspores.
			IV. Oospore.	IV. Oospore.
			V. Suspensor.	V. Suspensor.
			VI. Embryo imperfect.	VI. Embryo imperfect.
			VII. Normal plant.	VII. Normal plant.
			VIII. Sporangiferous leaf.	VIII. Sporangiferous leaf.
			IX. Macrosporangia.	IX. Macrosporangia.
			X. Microspores.	X. Microspores.

THE LIFE HISTORY.

Cryptogams.)

stomata present.

Oosphere enclosed in an archegonium.

III. Lycopodineæ.

Selaginella.

Isoetes.

Heterosporous: prothalli two.

Prothallus rudimentary ♂.

1. Prothallus rudimentary ♂.

Antheridium.

2. Antheridium.

Spermatozoids motile.

3. Spermatozoids motile.

Prothallus rudimentary ♀.

I. Prothallus rudimentary ♀.

Archegonium.

II. Archegonium.

Oosphere (Ovum or Germ Cell.)

III. Oosphere (Ovum or Germ Cell.)

Oospore.

4. Oospore.

Suspensor.

5. Suspensor.

Embryo imperfect.

6. Embryo with cotyledons.

Normal plant.

7. Normal plant.

Strobiliferous leaf.

8. Fertile leaves.

Microsporangia.

9. Microsporangia.

Microspores.

10. Microspores.

Oospore.

IV. Oospore.

Suspensor.

V. Suspensor.

Embryo imperfect.

IV. Embryo with cotyledons.

Normal plant.

VII. Normal plant.

Strobiliferous leaf.

VIII. Fertile leaves.

Macrosporangia.

IX. Macrosporangia.

Macrospores.

X. Macrospores.

IV. SPERMATOPHYTES

Plants producing true

I. Gymnosperms.

Carpels open. Seeds naked.

Plants heterosporous. Prothalli two; ♂ rudimentary.

Plants heterosporous.

1. Prothallus rudimentary, developed before fertilization.

1. Prothallus

2. Antheridium rudimentary. (Pollen tube.)

2. Antheridium

3. Spermatozoids none. Protoplasm of the antheridium.

3. Spermatozoids

I. Prothallus formed before fertilization, ♀ (endosperm) and parasitic upon the asexual generation.

I. Prothallus

II. Archegonium well formed.

II. Archegonium

III. Oosphere (Ovum or Germ Cell.)

III. Oosphere

4. Oospore.

4. Oospore.

5. Suspensor.

5. Suspensor.

6. Embryo with two or more cotyledons.

6. Embryo

7. Normal plant.

7. Normal

8. Anthophylla.

8. Stamens.

9. Microsporangia (Pollen sacs.)

9. Microsporangia

10. Microspores ♂. (Pollen.)

10. Microspores

IV. Oospore.

IV. Oospore.

V. Suspensor.

V. Suspensor.

VI. Embryo with two or more cotyledons.

VI. Embryo

VII. Normal plant.

VII. Normal

VIII. Carpophylla.

VIII. Ovary

IX. Macrosporangia (Ovules).

IX. Macrosporangia

X. Macrospores (Embryo sac) ♀

X. Macrospores

IV. SPERMA PHYTES.

Plants producing true seed.

	I. Gymnosperms.	II. Angiosperms.
Isoetes.	<i>Carpels open. Seeds naked.</i> <i>Plants heterosporous. Prothalli two; ♂ rudimentary.</i>	<i>Carpels closed. Seeds in an ovary.</i> <i>Plants heterosporous. Prothallus only one ♀ or wholly wanting.</i>
rudimentary ♂.	1. Prothallus rudimentary, developed before fertilization.	1. Prothallus not developed. Protoplasm of the microspore.
um.	2. Antheridium rudimentary. (Pollen tube.)	2. Antheridium rudimentary. (Pollen tube.)
oids motile.	3. Spermatozoids none. Protoplasm of the antheridium.	3. Spermatozoids none. Protoplasm of the antheridium.
llus rudimentary ♀.	I. Prothallus formed before fertilization, ♀ (endosperm) and parasitic upon the asexual generation.	I. Prothallus ♀ (Endosperm) formed after fertilization and parasitic on the asexual generation.
onium.	II. Archegonium well formed.	II. Archegonium not formed.
re (Ovum or Germ Cell 1)	III. Oosphere (Ovum or Germ Ccell.)	I II. Oosphere (Ovum or Germ Cell.)
r.	4. Oospore.	4. Oospore.
with cotyledons.	5. Suspensor.	5. Suspensor.
plant.	6. Embryo with two or more cotyledons.	6. Embryo with one or two cotyledons.
leaves.	7. Normal plant.	7. Normal plant.
rangia.	8. Anthophylla.	8. Stamens.
res.	9. Microsporangia (Pollen sacs.)	9. Microsporangia. (Cells of anther.)
re.	10. Microspores ♂. (Pollen.)	10. Microspores. (Pollen.)
ensor.	IV. Oospore.	IV. Oospore.
yo with cotyledons.	V. Suspensor.	V. Suspensor.
al plant.	VI. Embryo with two or more cotyledons.	VI. Embryo with one or two cotyledons.
le leaves.	VII. Normal plant.	VII. Normal plant.
osporangia.	VIII. Carpophylla.	VIII. Ovary.
ospores.	IX. Macrosporangia (Ovules).	IX. Macrosporangia. (Ovules.)
	X. Macrospores (Embryo sac) ♀	X. Macrospore. (Embryo sac.)